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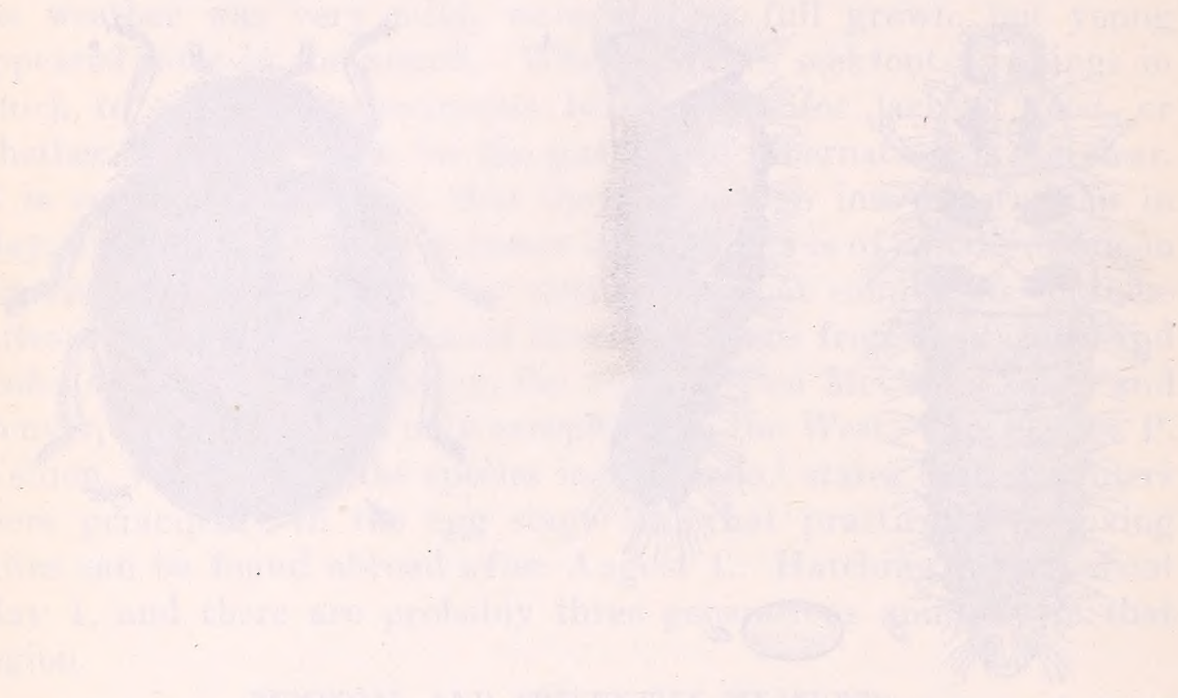

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BUREAU OF ENTOMOLOGY.

L. O. HOWARD, Entomologist and Chief of Bureau.

DAMAGE TO THE WOOD OF FIRE-KILLED DOUGLAS FIR, AND METHODS OF PREVENTING LOSSES, IN WESTERN WASHINGTON AND OREGON.[1]

By A. D. HOPKINS,
In Charge of Forest Insect Investigations.

Inquiries, with specimens, relating to extensive damage to fire-killed Douglas fir in western Washington showed the importance of making available to our correspondents some information based on the results of forest insect investigations.

Douglas-fir timber killed by fire is attacked by a class of wood-boring insects which extend their burrows through the sound sapwood and heartwood and thus contribute to the rapid deterioration and decay of a kind of resource which otherwise would be available for utilization during the periods of from 1 to 20 years or more after death of the trees, depending on the trees and character of product desired. This loss often amounts to from 25 to 100 per cent during the period in which the dead timber would otherwise be almost as valuable as living timber.

Whenever the dying and dead timber is available for utilization within one to six or more years, much, and sometimes practically all, of the loss due to wood-boring insects is preventable.

One class of wood-borers attacks the timber during the spring, summer, and fall months within the first week or two after the fire or after the trees begin to die, but rarely continues to work in the wood for more than one year, and all of some forms of the damage, especially to the sapwood, is caused within 30 to 60 days, while other forms continue during the warm season of the first or second year, depending on the date of the fire and the species of insect involved. Most of the damage is usually confined to the sapwood, but some of it may extend into the heartwood.

[1] Revised circular letter of June 16, 1909, sent to interested timber-land owners. It is here published to supplement Forest Service Bulletin 112 on Fire-Killed Douglas Fir, and Bureau of Entomology Circular 127, Insect Injuries to the Wood of Dying and Dead Trees.

Another class of wood-boring insects, represented by a number of species, attacks the trees three or four years after they die; these bore deep into the heartwood, thus causing serious damage. Insects of this class will continue to attack the trees year after year as long as they find sound wood in which to excavate their burrows. Therefore the damage increases year by year until the wood is rendered entirely worthless by the borings and by the subsequent decay which necessarily follows.

It is a fact, however, that there is often a great difference in the relative damage to individual trees which have died from injuries caused by the same fire. Some trees will be ruined in a few years, while others will be but slightly damaged and remain sound for 10, 20, or even, in exceptional cases, 50 years.

The date or period of the fire or fires is an important factor in relation to subsequent injury by insects. It is well known that timber killed by fire at some seasons of the year will remain sound much longer than that killed at other seasons.

The character of the primary injury and the date or season of the subsequent death of the individual trees is also important. Some of the trees will die immediately after the fire, while others will die at intervals for a year or more. Those dying at different times and seasons will show very different conditions as to subsequent damage by wood-boring insects. Then, again, different ages and types of trees of the same species will show very different rates of damage, as will also different species of trees.

It is somewhat different in the case of timber killed by bark-beetles or defoliating insects, because in such cases the timber usually dies within definite periods and is therefore subject to attack by special kinds of wood-boring insects.

REQUISITES FOR SUCCESS IN PREVENTING LOSSES.

In regard to methods of preventing losses from damage by wood-boring insects to fire-killed timber there are a few fundamental requisites for success which should be carefully considered before action is taken. Among these are the recognition of the different *classes of injury* and of the importance of expert advice on some of the essential details in any plans for extensive operations to prevent losses.

CLASSES OF INSECTS AND INJURY.

Some of the important classes of insects and injury are as follows:

(1) Certain pinhole borers (ambrosia beetles) attack the sapwood as soon as the trees begin to die, but the damage by this class of borers is usually limited to the first season.

(2) Certain species and classes of bark and wood boring grubs hatch from eggs deposited in the bark of the trees and burrow under the bark for a time before they enter the wood. Some species do not go beyond the sapwood, while others bore deep into the heartwood.

(3) Certain stages and classes of bark-boring grubs hatching from eggs deposited in the bark attack the dying and dead trees, but never enter the wood.

(4) Certain species and classes of wood-boring grubs attack the sapwood of trees dead one to three years and confine their borings to the sapwood.

(5) Certain species and classes of wood-boring grubs and other insects enter the wood of trees dead three to twenty years or more and bore deep into the heartwood.

CONDITIONS GOVERNING THE WORK OF INSECTS OF THE DIFFERENT CLASSES.

(A) In classes 1 to 4, inclusive, the presence of bark on the trunks of the trees is, with a few exceptions, necessary as a receptacle for the eggs and as the first food of the young grubs. The exceptions are the pinhole borers or ambrosia beetles, which will sometimes attack the wood when the bark is removed, although the wood must be in a moist condition. The bark, however, offers far more favorable conditions for the work of this class of insects because it provides for a continued moist condition of the wood.

(B) In class 5 the bark is not essential. Although offering favorable conditions for the attack of some species of insects, it is not necessary for the attack of others, especially after the sapwood begins to decay.

GENERAL METHODS OF CONTROL.

Condition A.

To avoid damage from wood-boring insects which are dependent upon condition A, one or more of the following general methods should be adopted, so far as the local facilities and cost will permit:

(*a*) Prompt utilization of the timber within 30 to 60 days after it is killed by fire any time from the beginning of the growth of vegetation in the spring until it stops in the fall, which will vary with latitude and altitude. Timber killed after the first snow or heavy frost should be utilized within 30 days after plant activity starts in the following spring if deterioration is to be prevented.

(*b*) Prompt removal of the bark from the merchantable timber under the same requirements as to periods mentioned under (*a*).

(*c*) Placing the unbarked logs in water under the same requirements as to periods mentioned under (*a*).

In addition to the general requirements of the principal methods (*a*, *b*, and *c*), each of classes 1, 2, 3, and 4, and each of the many species of each class require some different or specific detail in the method to insure the best success. Therefore when it is desired to avoid a special class of injury expert advice should be secured.

Condition B.

Under condition B the opportunities are much less favorable for the prevention of further losses. After the timber has been dead three to twenty years or more, one or more of the following methods should be considered and adopted whenever practicable.

Merchantable timber dead three to five years.

(*d*) Timber dead three to five years should be cut and converted into lumber with as little delay as possible, or

(*e*) Cut into logs and placed in water, to remain there until it can be converted into lumber or other products.

Merchantable timber dead six to ten years or longer.

(*f*) Thoroughly inspect individual trees to locate and mark those that are yet available for utilization, and make estimates on which to base conclusions as to whether or not it can be profitably logged for direct utilization or storage in water.

Approved:

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., *May 16, 1912.*

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